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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/988,660	11/20/2001	Mark Myers	017750-507	9021

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EXAMINER

LEE, SHUN K

ART UNIT	PAPER NUMBER
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2878

DATE MAILED: 10/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/988,660	MYERS ET AL.	
	Examiner	Art Unit	
	Shun Lee	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4, 6 and 9-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4, 6 and 9-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 22 September 2004 has been entered.

Claim Objections

2. Claims 4 and 10 are objected to because of the following informalities:
- (a) in claim 4, "microns" on line 16 and again on line 17 should probably be --micrometer--.
 - (b) in claim 10, "the wavelength of the second color band" on line 2 should probably be --one of the wavelengths of the second color band-- (since independent claim 4 recites multiple wavelengths *i.e.*, "a second color band of infrared energy having wavelengths of 8 to 12 microns").
 - (c) in claim 10, "the first wavelength of the first color band" on line 3 should probably be --one of the wavelengths of the first color band-- (since independent claim 4 recites multiple wavelengths *i.e.*, "a first color band of infrared energy having wavelengths of 3 to 5 microns").

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 4, 6, and 9-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification discloses (paragraph 2) "The intermediate-infrared radiation region is often further broken into the mid-wave (MWIR) region with wavelength limits of 3-5 μm and the long-wave (LWIR) region with wavelength limits of 8-12 μm " and (paragraph 8) that "The second aspherical surface profile has a holographic optical element that color corrects at least one color band of infrared energy. The holographic optical element may detect a second or subsequent wavelength of IR energy that is a harmonic component of the first wavelength. Preferably, the holographic optical element color corrects a red MWIR band and a blue MWIR band. The holographic optical element also coincidentally focuses a MWIR band and a LWIR band of IR energy at a common focal plane. The detector detects and manipulates at least three wavelengths of IR energy including at least one LWIR band of energy, preferably an indigo LWIR band". Thus while the specification discloses color correcting at least one color band of

infrared energy, the specification does not disclose that the at least one color band of infrared energy have wavelengths of 3 to 5 microns (or 8 to 12 microns).

Therefore, the newly added limitation of "wherein the holographic optical element color corrects both a first color band of infrared energy having wavelengths of 3 to 5 microns and a second color band of infrared energy having wavelengths of 8 to 12 microns" as recited in independent claim 4 was not described in the specification.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 4, 9-13, and 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Howard *et al.* (US 4,507,551) in view of Applicant's Admitted Prior Art, Amos (US 5,369,511), and Ben-Menachem *et al.* (US 2001/0029816).

In regard to claims **4**, **9-13**, and **15-20**, Howard *et al.* disclose (Fig.) an infrared imaging apparatus, comprising:

- (a) a dewar (10), having an internal volume that defines a cold space;
- (b) an IR transmissive window (28) that seals the cold space to receive IR energy directly from an IR source;
- (c) a first lens (12) located within the cold space to receive IR energy directly from the IR transmissive window (28), wherein the first lens (12) is made of germanium (column 2, lines 63-68);
- (d) an IR detector (14) located within the cold space in operational communication with the first lens (12); and
- (e) an optical stop (16) located within the cold space in front of the first lens (12).

While Howard *et al.* also disclose (column 2, line 9 to column 3, line 30) using well known techniques of lens system design in order to obtain a desired field of view, the apparatus of Howard *et al.* lacks an explicit description that the first lens (12) is an aspheric silicon lens with a first aspheric profile (e.g., radius=-0.94467, k=28.345216; a=-2.13952, b=-69.5274, c=2342.04, d=-56841.9, and first surface thickness=0.548467 or radius=-1.23508; k=36.049455; a=-1.69104; b=-98.6413; c=5589.83; d=-162359; and first surface thickness=0.761661) on a first side and on a second side facing the detector and parallel to the first side, a second aspheric profile (e.g., radius=-0.61281; k=0.1399; a=0.033459; b=-2.3598; c=10.889; d=-36.331; and second surface thickness=0.462731 or radius=-0.81270; k=-0.10748; a=0.054475; b=-0.72423; c=2.9155; d=-7.8939; and second surface thickness=0.480234) having a holographic

Art Unit: 2878

optical element (e.g., -0.0051393, -0.10212, 0.91035, -2.3946 or -0.017112, -0.038991, 0.55069, -1.6405) for color correcting both a first color band of infrared energy having wavelengths of 3 to 5 microns and a second color band of infrared energy having wavelengths of 8 to 12 microns such that a focal plane of at least a first IR energy wavelength and second IR energy wavelength (which is a harmonic component of the first wavelength) is at a position coincident (*i.e.*, common focal plane) to the IR detector (14) so as to provide a square field of view of 90X90 degrees with an F-stop (F/#) of at least 1.4.

However, techniques of lens system design comprising aspheric surfaces are well known in the art. For example, Applicant admits (paragraph 0027) it is well known in the art to use commercially available software for designing aspheric lens. Further, Ben-Menachem *et al.* teach (paragraphs 0002, 0003, and 0075) that a single element (e.g., an aspheric silicon lens for the infrared wavelength regions) with a holographic optical element on an aspheric surface provides optimum design benefit wherein residual aberrations are corrected. In addition, Amos teaches (column 18, line 43 to column 19, line 9) that a holographic optical element corrects chromatic aberration so that all wavelengths of the infrared light combine at a point or focus. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide an aspheric silicon lens with a holographic optical element in the apparatus of Howard *et al.*, in order to correct for optical (e.g., chromatic) aberrations so as to obtain a desired field of view (e.g., a square field of view of 90X90 degrees with an F-stop (F/#) of at least 1.4).

8. Claims 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Howard *et al.* (US 4,507,551) in view of Applicant's Admitted Prior Art, Amos (US 5,369,511), and Ben-Menachem *et al.* (US 2001/0029816) as applied to claim 4 above, and further in view of Tennant *et al.* (US 6,034,407).

In regard to claims **6** and **14**, which are dependent on claim 4, the apparatus of Howard *et al.* lacks that the detector is a hyperspectral detector which detects at least three wavelengths of IR energy including at least one LWIR band of energy and concurrently collects radiation from multiple, adjacent spectral radiation bands. However, hyperspectral detectors are well known in the art. For example, Tennant *et al.* teach (column 1, lines 17-36, column 2, lines 13-36) that a hyperspectral detector offers concurrent collection of multiple, adjacent spectral infrared radiation bands. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a hyperspectral detector in the apparatus of Howard *et al.*, in order to detect multiple, adjacent spectral radiation bands (e.g., at least three wavelengths of IR energy including at least one LWIR band of energy).

Response to Arguments

9. Applicant's arguments filed 22 September 2004 have been fully considered but they are not persuasive.

Applicant argues (pg. 12 of remarks filed 22 September 2004) that the proposed combination does not disclose, teach or suggest correcting two different parts of the electromagnetic spectrum on the same physical lens surface since the cited prior art has only one centerline wavelength whereas the claimed first lens has two centerline

wavelengths since the claimed infrared imaging apparatus essentially allows one to place two holographic elements on the same physical lens surface. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (*i.e.*, two holographic elements on the same physical lens surface) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Moreover, applicant's arguments are not persuasive since applicant does not identify any disclosure in the cited references which support applicant's assertion that the cited prior art has only one centerline wavelength. On the contrary, Amos states (column 18, lines 47-60) that " ... one may employ ... diffractive components such as holographic optical elements ... binary optics techniques add a notched diffractive component to the refractive lens so that chromatic aberration is corrected. This results in all wavelengths of the light being combined at a point or focus" and (column 5, lines 11-15) that "It is again emphasized that the principles of the instant invention are applicable to the entire electromagnetic spectrum and are not limited to conventional holography or to the visual or near-visual spectra, such as ultraviolet and infrared frequencies or X-rays". Thus Amos expressly teaches that a holographic optical element corrects chromatic aberration so that all wavelengths of the infrared light combine at a point or focus.

In response to applicant's arguments (first three paragraphs on pg. 13 of remarks filed 22 September 2004) against the references individually, one cannot show

Art Unit: 2878

nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant then argues (last paragraph on pg. 13 of remarks filed 22 September 2004) that the other cited references when considered in combination with Howard *et al.* fail to disclose, teach or suggest a holographic optical element on an aspheric surface that color corrects at least two color bands of infrared energy. Examiner respectfully disagrees. It should be noted that Ben-Menachem *et al.* state (paragraph 0075) that " ... Diffractive optical element patterns are produced by machining, on the surface of the element, a diffractive structure ... used to further correct for residual aberrations present in the element. In this way, the optimum design benefit can be obtained from a single element. Diffractive optics patterns can be applied to any surface, whether flat, spherical or aspheric". Thus Ben-Menachem *et al.* explicitly teach that a single element (*i.e.*, aspheric silicon lens) with a holographic optical element on an aspheric surface provides optimum design benefit wherein residual aberrations are corrected. As discussed above, Amos expressly teaches that a holographic optical element corrects chromatic aberration so that all wavelengths of the infrared light combine at a point or focus. Therefore the obvious combination of the cited references disclose, teach or suggest all recited claim limitations including a holographic optical element on an aspheric surface which color corrects at least two color bands of infrared energy.


Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SL


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